

# **Common Sensor Data Record Science Processing Algorithm (C-SDR\_SPA) User's Guide**

**Version 1.8**

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**GODDARD SPACE FLIGHT CENTER  
GREENBELT, MARYLAND**

# **Common Sensor Data Record Science Processing Algorithm**

## **C-SDR\_SPA**

### **General**

The NASA Goddard Space Flight Center's (GSFC) Direct Readout Laboratory (DRL), Code 606.3 developed this software for the International Polar Orbiter Processing Package (IPOPP). IPOPP maximizes the utility of Earth science data for making real-time decisions by giving fast access to instrument data and derivative products from the Suomi National Polar-orbiting Partnership (SNPP), Aqua, and Terra missions and, in the future, the Joint Polar Satellite System (JPSS) mission.

Users must agree to all terms and conditions in the Software Usage Agreement on the DRL Web Portal before downloading this software.

Software and documentation published on the DRL Web Portal may occasionally be updated or modified. The most current versions of DRL software are available at the DRL Web Portal:

<http://directreadout.sci.gsfc.nasa.gov/?id=software>

Questions relating to the contents or status of this software and its documentation should be addressed to the DRL via the Contact DRL mechanism at the DRL Web Portal:

<http://directreadout.sci.gsfc.nasa.gov/?id=dspContent&cid=66>

### **Algorithm Wrapper Concept**

The DRL has developed an algorithm wrapper to provide a common command and execution interface to encapsulate multi-discipline, multi-mission science processing algorithms. The wrapper also provides a structured, standardized technique for packaging new or updated algorithms with minimal effort.

A Science Processing Algorithm (SPA) is defined as a wrapper and its contained algorithm. SPAs will function in a standalone, cross-platform environment to serve the needs of the broad Direct Readout community. Detailed information about SPAs and other DRL technologies is available at the DRL Web Portal.

### **Software Description**

This software package contains the Common Sensor Data Record Science Processing Algorithm (C-SDR\_SPA). The C-SDR software package processes Suomi NPP VIIRS, ATMS and CrIS Raw Data Record (RDR) HDF5 products into corresponding instrument-specific and mission-compliant HDF5 Sensor Data Record (SDR) and Geolocation swath products. The SPA functions in two modes: Standalone, or as an IPOPP plug-in.

### **Software Version**

Version 1.8 of the DRL algorithm wrapper was used to package the SPA described in this document. This SPA package contains the Interface Data Processing Segment (IDPS)

Direct Readout (DRO) Software. The IDPS DRO Software leverages the following versions of the IDPS OPS Software:

- a) VIIRS SDR, 1.5.08.04;
- b) CrIS SDR, 1.5.08.04;
- c) ATMS SDR, 1.5.08.04.

The DRO Algorithm software is a standalone process consisting of reuse from Algorithm Development Library (ADL), Processing Subsystem (PRO), Data Delivery Subsystem (DDS), and Ingest Subsystem (ING) code, which has been extended and specialized with additional code. This software, collectively referred to as DRO, is an implementation of NPP Algorithm support using NPP ADL packaging for standalone use in a Direct Readout environment.

Enhancements to this SPA include an update to v1.5.08.04 (Mx8.4) of the official operational SDR software.

This software will execute on a 64-bit computer, and has been tested on computers with 32 GB RAM with the following operating systems:

- a) Fedora 18 X86\_64;
- b) CentOS Linux 6.4 X86\_64;
- c) OpenSUSE Linux 12.1 X86\_64;
- d) Kubuntu 13.04 X86\_64.

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## Credits

The Direct Readout SDR algorithms within C-SDR\_SPA were provided to the DRL by the JPSS Ground Project.

## Prerequisites

To run this package, you must have the Java Development Kit (JDK) or Java Runtime Engine (JRE) (Java 1.6.0\_25 or higher) installed on your computer, and have the Java installation bin/ subdirectory in your PATH environment variable.

## Program Inputs and Outputs

This SPA includes SDR algorithms for the Suomi NPP VIIRS, CrIS and ATMS instruments.

The VIIRS SDR algorithm takes a VIIRS RDR file (containing VIIRS Science RDR and Spacecraft Diary RDR) and required ancillaries as input and outputs the VIIRS Imagery resolution SDRs, VIIRS Moderate resolution SDRs, the VIIRS Day/Night Band (DNB) SDR, the VIIRS On Board Calibrator IP Intermediate Product (IP), the VIIRS Calibrated Dual Gain IP, and the VIIRS Geolocation products.

The ATMS SDR algorithm takes an ATMS RDR file (containing ATMS Science RDR and Spacecraft Diary RDR) and required ancillaries as input and outputs the ATMS SDR, the ATMS Temperature Data Record (TDR), and the ATMS Geolocation products.

The CrIS SDR algorithm takes a CrIS RDR file (containing CrIS Science RDR and Spacecraft Diary RDR) and required ancillaries as input and outputs the CrIS SDR and Geolocation products.

## **Installation and Configuration**

Download the C-SDR\_1.8\_SPA\_1.7.tar.gz and C-SDR\_1.8\_SPA\_1.7\_testdata.tar.gz (optional) files into the same directory.

Decompress and un-archive the C-SDR\_1.8\_SPA\_1.7.tar.gz and C-SDR\_1.8\_SPA\_1.7\_testdata.tar.gz (optional) files:

```
$ tar -xzf C-SDR_1.8_SPA_1.7.tar.gz  
$ tar -xzf C-SDR_1.8_SPA_1.7_testdata.tar.gz
```

This will create the following subdirectories:

```
SPA  
  C-SDR  
    algorithm  
    ancillary  
    station  
    testdata  
    testscripts  
    wrapper
```

**Installing into an IPOPP Framework:** This SPA can also be installed dynamically into an IPOPP framework to automate production of VIIRS, CrIS, and ATMS SDR data products. The SPA installation process will install SPA station(s) into IPOPP. An SPA station is an IPOPP agent that provides the mechanism necessary for running an SPA automatically within the IPOPP framework. Once this SPA is installed, users must enable the station(s) corresponding to the SPA. Instructions for installing a SPA and enabling its stations are contained in the IPOPP User's Guide (available on the DRL portal along with the IPOPP package). The SPA stations for this SPA are listed in Appendix A.

## **Software Package Testing and Validation**

The testscripts subdirectory contains test scripts that can be used to verify that your current installation of the SPA is working properly, as described below. Note that the optional C-SDR\_1.8\_SPA\_1.7\_testdata.tar.gz file is required to execute these testing procedures.

*Step 1:*cd into the testscripts directory.

*Step 2:*There are scripts named run-viirs.sh, run-atms.sh and run-cris.sh inside the testscripts directory.

To run the VIIRS SDR algorithm, use:

```
$ ./run-viirs.sh
```

Execution time depends on the speed of your computer and the number of granules in the VIIRS RDR input. If everything is working properly, the script will terminate with a message such as:

```
Output viirs.gdnbo is /home/ipopp/SPA/C-SDR/testdata/output/GDNBO.h5
Output viirs.gimgo is /home/ipopp/SPA/C-SDR/testdata/output/GIMGO.h5
Output viirs.gitco is /home/ipopp/SPA/C-SDR/testdata/output/GITCO.h5
Output viirs.gmodo is /home/ipopp/SPA/C-SDR/testdata/output/GMODO.h5
Output viirs.gmtco is /home/ipopp/SPA/C-SDR/testdata/output/GMTCO.h5
Output viirs.icdbg is /home/ipopp/SPA/C-SDR/testdata/output/ICDBG.h5
Output viirs.ivcddb is /home/ipopp/SPA/C-SDR/testdata/output/IVCDB.h5
Output viirs.ivobc is /home/ipopp/SPA/C-SDR/testdata/output/IVOBC.h5
Output viirs.svndb is /home/ipopp/SPA/C-SDR/testdata/output/SVDNB.h5
Output viirs.svi01 is /home/ipopp/SPA/C-SDR/testdata/output/SVI01.h5
Output viirs.svi02 is /home/ipopp/SPA/C-SDR/testdata/output/SVI02.h5
Output viirs.svi03 is /home/ipopp/SPA/C-SDR/testdata/output/SVI03.h5
Output viirs.svi04 is /home/ipopp/SPA/C-SDR/testdata/output/SVI04.h5
Output viirs.svi05 is /home/ipopp/SPA/C-SDR/testdata/output/SVI05.h5
Output viirs.svm01 is /home/ipopp/SPA/C-SDR/testdata/output/SVM01.h5
Output viirs.svm02 is /home/ipopp/SPA/C-SDR/testdata/output/SVM02.h5
Output viirs.svm03 is /home/ipopp/SPA/C-SDR/testdata/output/SVM03.h5
Output viirs.svm04 is /home/ipopp/SPA/C-SDR/testdata/output/SVM04.h5
Output viirs.svm05 is /home/ipopp/SPA/C-SDR/testdata/output/SVM05.h5
Output viirs.svm06 is /home/ipopp/SPA/C-SDR/testdata/output/SVM06.h5
Output viirs.svm07 is /home/ipopp/SPA/C-SDR/testdata/output/SVM07.h5
Output viirs.svm08 is /home/ipopp/SPA/C-SDR/testdata/output/SVM08.h5
Output viirs.svm09 is /home/ipopp/SPA/C-SDR/testdata/output/SVM09.h5
Output viirs.svm10 is /home/ipopp/SPA/C-SDR/testdata/output/SVM10.h5
Output viirs.svm11 is /home/ipopp/SPA/C-SDR/testdata/output/SVM11.h5
Output viirs.svm12 is /home/ipopp/SPA/C-SDR/testdata/output/SVM12.h5
Output viirs.svm13 is /home/ipopp/SPA/C-SDR/testdata/output/SVM13.h5
Output viirs.svm14 is /home/ipopp/SPA/C-SDR/testdata/output/SVM14.h5
Output viirs.svm15 is /home/ipopp/SPA/C-SDR/testdata/output/SVM15.h5
Output viirs.svm16 is /home/ipopp/SPA/C-SDR/testdata/output/SVM16.h5
```

To run the ATMS SDR algorithm, use:

```
$ ./run-atms.sh
```

Execution time depends on the speed of your computer and the number of granules in the ATMS RDR input. If everything is working properly, the script will terminate with a message such as:

```
Output atms.fatms is /home/ipopp/SPA/C-SDR/testdata/output/FATMS.h5  
Output atms.gatmo is /home/ipopp/SPA/C-SDR/testdata/output/GATMO.h5  
Output atms.satms is /home/ipopp/SPA/C-SDR/testdata/output/SATMS.h5  
Output atms.tatms is /home/ipopp/SPA/C-SDR/testdata/output/TATMS.h5
```

To run the CrIS SDR algorithm, use:

```
$ ./run-cris.sh
```

Execution time depends on the speed of your computer and the number of granules in the CrIS RDR input. If everything is working properly, the script will terminate with a message such as:

```
Output cris.gcrso is /home/ipopp/SPA/C-SDR/testdata/output/GCRSO.h5  
Output cris.rgcrs is /home/ipopp/SPA/C-SDR/testdata/output/RGCRS.h5  
Output cris.rgtrs is /home/ipopp/SPA/C-SDR/testdata/output/RGTRS.h5  
Output cris.scris is /home/ipopp/SPA/C-SDR/testdata/output/SCRIS.h5
```

You can cd to the output directory to verify that the science products exist. Test output product(s) are available for comparison in the testdata/output directory. These test output product(s) were generated on a 64-bit PC architecture computer running Fedora 14. The output products serve as an indicator of expected program output. Use a comparison utility (such as diff, h5diff, etc.) to compare your output product(s) to those provided in the testdata/output directory. Locally generated files may differ slightly from the provided output files because of differences in machine architecture or operating systems.

If there is a problem and the code terminates abnormally, the problem can be identified using the log files. Log files are automatically generated within the directory used for execution. They start with stdfile\* and errfile\*. Other log and intermediate files may be generated automatically within the directory used for execution. They are useful for traceability and debugging purposes. However it is strongly recommended that users clean up log files and intermediate files left behind in the run directory before initiating a fresh execution of the SPA. Intermediate files from a previous run may affect a successive run and produce ambiguous results. Please report any errors that cannot be fixed to the DRL.

## **Program Operation**

In order to run the package using your own input data, you can either use the run scripts within the wrapper subdirectories, or modify the test scripts within the testscripts subdirectory.

### **To Use the Run Scripts**

**Identify the 'run' scripts:** The wrapper directory within this package contains three subdirectories named VIIRS\_C-SDR, ATMS\_C-SDR and CRIS\_C-SDR. Each subdirectory contains an executable called 'run'. Execute the 'run' within the correct wrapper subdirectory to run the corresponding SDR algorithm. For instance, the 'run' within wrapper/VIIRS\_C-SDR is used for creating VIIRS SDR outputs. The 'run'; within wrapper/ATMS\_C-SDR and wrapper/CRIS\_C-SDR is used for creating ATMS and CrIS SDR products respectively. Note that to execute 'run', you need to have java on your path.

**Specify input parameters using <label value> pairs:** To execute the 'run' scripts, you must supply the required input and output parameters. Input and output parameters are usually file paths or other values (e.g., an automatic search flag). Each parameter is specified on the command line by a <label value> pair. Labels are simply predefined names for parameters. Each label must be followed by its actual value. Each process has its own set of <label value> pairs that must be specified in order for it to execute. Some of these pairs are optional, meaning the process would still be able to execute even if that parameter is not supplied. The two types of <label value> pairs that the C\_SDR\_SPA uses are:

- a) Input file label/values. These are input file paths. Values are absolute or relative paths to the corresponding input file.
- b) Output file label/values. These are output files that are produced by the SPA. Values are absolute or relative paths of the files you want to generate.

The following tables contain labels, and their descriptions, required by the C-SDR\_SPA.

### VIIRS SDR:

Input File Labels	Description	Source
viirs.rdr	VIIRS Raw Data Record (RDR) file	DRL ftp site for real-time VIIRS RDR over the eastern US region: <a href="ftp://is.sci.gsfc.nasa.gov/gsfcdata/npp/viirs/I_evel0/RNSCA-RVIRS_npp_dyyyymmdd_thhmmssS_ehhmmssS*.h5">ftp://is.sci.gsfc.nasa.gov/gsfcdata/npp/viirs/I_evel0/RNSCA-RVIRS_npp_dyyyymmdd_thhmmssS_ehhmmssS*.h5</a> Where yyyy, mm, dd represents the year, month, and day for start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath. For other RDRs : <a href="http://www.class.noaa.gov">www.class.noaa.gov</a>
tle	Two Line Element (TLE) ancillary file	DRL ftp site for TLEs: <a href="ftp://is.sci.gsfc.nasa.gov/ancillary/ephemeris/tle/drl.tle.yyyyymmddhh">ftp://is.sci.gsfc.nasa.gov/ancillary/ephemeris/tle/drl.tle.yyyyymmddhh</a> Archived TLEs: <a href="ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/ephemeris/tle/drl.tle.yyyyymmddhh">ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/ephemeris/tle/drl.tle.yyyyymmddhh</a> Where yyyy, mm, dd, hh represents the year, month, day, and hour for the tle ancillary file.
polar	Polar Wander ancillary file	DRL ftp site for Polar Wander files: <a href="ftp://is.sci.gsfc.nasa.gov/ancillary/temporal/off_USNO-PolarWander-UT1-ANC_Ser7_USNO_000f_yyyyymmdd*.ascii">ftp://is.sci.gsfc.nasa.gov/ancillary/temporal/off_USNO-PolarWander-UT1-ANC_Ser7_USNO_000f_yyyyymmdd*.ascii</a> Archived Polar Wander files: <a href="ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/temporal/off_USNO-PolarWander-UT1-ANC_Ser7_USNO_000f_yyyyymmdd*.ascii">ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/temporal/off_USNO-PolarWander-UT1-ANC_Ser7_USNO_000f_yyyyymmdd*.ascii</a> Where yyyy, mm, dd represents the year, month, and day for the polar wander ancillary file.

sdr.lut	VIIRS Look Up Tables (LUTs) compressed tar file (Optional)	DRL ftp site for VIIRS LUTs: <a href="ftp://is.sci.gsfc.nasa.gov/ancillary/LUTs/npp/viirs/1.5.07.01/">ftp://is.sci.gsfc.nasa.gov/ancillary/LUTs/npp/viirs/1.5.07.01/</a> VIIRS-SDR_BE_LUTs_yymmdd.tar.gz  Archived VIIRS LUTs: <a href="ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/LUTs/npp/viirs/VIIRS-SDR_BE_LUTs_yymmdd.tar.gz">ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/LUTs/npp/viirs/VIIRS-SDR_BE_LUTs_yymmdd.tar.gz</a>  Where yy, mm, dd represents the year, month, and day for the LUT collection file.
leapsec	Leapsec ancillary file	DRL ftp site for leapsec files: <a href="ftp://is.sci.gsfc.nasa.gov/ancillary/temporal/leapsec.yyyymmddhh">ftp://is.sci.gsfc.nasa.gov/ancillary/temporal/leapsec.yyyymmddhh</a>  Where yyyy, mm, dd, hh represents the year, month, day, and hour for the leapsec ancillary file.
Output File Labels	Description	Destination (when SPA is installed in IPOPP)
viirs.gitco	VIIRS IMG Terrain Corrected Geolocation output HDF file path	/raid/pub/gsfcdata/npp/viirs/level1/GITCO_npp_dyyyymmdd_thhmmssS_ehhmmssS*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath.
viirs.gimgo	VIIRS IMG Geolocation output HDF file path	/raid/pub/gsfcdata/npp/viirs/level1/GIMGO_npp_dyyyymmdd_thhmmssS_ehhmmssS*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath.
viirs.gmtco	VIIRS MOD Terrain Corrected Geolocation output HDF file path	/raid/pub/gsfcdata/npp/viirs/level1/GMTCO_npp_dyyyymmdd_thhmmssS_ehhmmssS*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour,

		minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath.
viirs.gmodo	VIIRS MOD Geolocation output HDF file path	/raid/pub/gsfcdtdata/npp/viirs/level1/GMODO_npp_dyyyymdd_thhmmssS_ehhmmss*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath.
viirs.gdnbo	VIIRS Day/Night Band Geolocation output HDF file path	/raid/pub/gsfcdtdata/npp/viirs/level1/GDNBO_npp_dyyyymdd_thhmmssS_ehhmmss*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath.
viirs.icdbg	VIIRS MOD Unaggregated Geolocation output HDF file path	/raid/pub/gsfcdtdata/npp/viirs/level1/ICDBG_npp_dyyyymdd_thhmmssS_ehhmmss*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath.
viirs.svdbn	VIIRS Day/Night band SDR output HDF file path	/raid/pub/gsfcdtdata/npp/viirs/level1/SVDNB_npp_dyyyymdd_thhmmssS_ehhmmss*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath.
viirs.svixx {xx = 01 to 05}	VIIRS 375m Ix {x = 1 to 5} band SDR output HDF file path	/raid/pub/gsfcdtdata/npp/viirs/level1/SVlx_np_p_dyyyymdd_thhmmssS_ehhmmss*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath;

		the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath.
viirs.svmxx {xx = 01 to 16}	VIIRS 750m Mx {x = 1 to 16} band SDR output HDF file path	/raid/pub/gsfcdata/npp/viirs/level1/SVMxx_npp_dyyyymmdd_thhmmssS_ehhmmssS*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath
viirs.ivobc	VIIRS On Board Calibrator IP output HDF file path	/raid/pub/gsfcdata/npp/viirs/level1/IVOBC_npp_dyyyymmdd_thhmmssS_ehhmmssS*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath
viirs.ivcdb	VIIRS Calibrator Dual Gain IP output HDF file path	/raid/pub/gsfcdata/npp/viirs/level1/IVCDB_npp_dyyyymmdd_thhmmssS_ehhmmssS*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath

## ATMS SDR:

Input File Labels	Description	Source
atms.rdr	ATMS Raw Data Record (RDR) file	DRL ftp site for real-time ATMS RDR over the eastern US region: <a href="ftp://is.sci.gsfc.nasa.gov/gsfcdata/npp/atms/level0/RATMS-RNSCA_npp_dyyyymmdd_thhmmssS_ehhmmssS*.h5">ftp://is.sci.gsfc.nasa.gov/gsfcdata/npp/atms/level0/RATMS-RNSCA_npp_dyyyymmdd_thhmmssS_ehhmmssS*.h5</a> Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath. For other RDRs: <a href="http://www.class.noaa.gov">www.class.noaa.gov</a>
tle	Two Line Element (TLE) ancillary file	DRL ftp site for TLEs: <a href="ftp://is.sci.gsfc.nasa.gov/ancillary/ephemeris/tle/drl.tle.yyyymmddhh">ftp://is.sci.gsfc.nasa.gov/ancillary/ephemeris/tle/drl.tle.yyyymmddhh</a> Archived TLEs: <a href="ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/ephemeris/tle/drl.tle.yyyymmddhh">ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/ephemeris/tle/drl.tle.yyyymmddhh</a> Where yyyy, mm, dd, hh represents the year, month, day, and hour for the tle ancillary file.
polar	Polar Wander ancillary file	DRL ftp site for Polar Wander files: <a href="ftp://is.sci.gsfc.nasa.gov/ancillary/temporal/off_USNO-PolarWander-UT1-ANC_Ser7_USNO_000f_yyyymmdd*.ascii">ftp://is.sci.gsfc.nasa.gov/ancillary/temporal/off_USNO-PolarWander-UT1-ANC_Ser7_USNO_000f_yyyymmdd*.ascii</a> Archived Polar Wander files: <a href="ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/temporal/off_USNO-PolarWander-UT1-ANC_Ser7_USNO_000f_yyyymmdd*.ascii">ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/temporal/off_USNO-PolarWander-UT1-ANC_Ser7_USNO_000f_yyyymmdd*.ascii</a> Where yyyy, mm, dd represents the year, month, and day for the polar wander ancillary file.

sdr.lut	ATMS Look Up Tables (LUTs) compressed tar file (optional)	DRL ftp site for ATMS LUTs: <a href="ftp://is.sci.gsfc.nasa.gov/ancillary/LUTs/npp/atms/">ftp://is.sci.gsfc.nasa.gov/ancillary/LUTs/npp/atms/</a> ATMS-SDR_BE_LUTs_yymmdd.tar.gz  Archived ATMS LUTs: <a href="ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/LUTs/npp/atms/">ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/LUTs/npp/atms/</a> ATMS-SDR_BE_LUTs_yymmdd.tar.gz  Where yy, mm, dd represents the year, month, and day for the LUT collection file.
leapsec	Leapsec ancillary file	DRL ftp site for leapsec files: <a href="ftp://is.sci.gsfc.nasa.gov/ancillary/temporal/">ftp://is.sci.gsfc.nasa.gov/ancillary/temporal/</a> leapsec.yyyymmddhh  Where yyyy, mm, dd, hh represents the year, month, day, and hour for the leapsec ancillary file.
Output File Labels	Description	Destination (when SPA is installed into IPOPP)
atms.satms	ATMS Science SDR output HDF file path	/raid/pub/gsfcdata/npp/atms/level1/SATMS_npp_dyymmdd_thhmmssS_ehhmmssS*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath.
atms.fatms	ATMS Science SDR (full sized, floating point version) output HDF file path	/raid/pub/gsfcdata/npp/atms/level1/FATMS_npp_dyymmdd_thhmmssS_ehhmmssS*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath.
atms.tatms	ATMS Science TDR output HDF file path	/raid/pub/gsfcdata/npp/atms/level1/TATMS_npp_dyymmdd_thhmmssS_ehhmmssS*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh,

		mm, ss, S represents the end time of the swath.
atms.gatmo	ATMS SDR Geolocation output HDF file path	/raid/pub/gsfcdata/npp/atms/level1/GATMO_npp_dyyyymmdd_thhmmssS_ehhmmss*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath.

## CrIS SDR:

Input File Labels	Description	Source
cris.rdr	CrIS Raw Data Record (RDR) file	DRL ftp site for real-time CrIS RDR over the eastern US region: <a href="ftp://is.sci.gsfc.nasa.gov/gsfcdata/npp/cris/level0/">ftp://is.sci.gsfc.nasa.gov/gsfcdata/npp/cris/level0/</a> RCRIS-RNSCA_npp_dyymmdd_thmmssS_ehhmmssS*.h5 Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath. For other RDRs: <a href="http://www.class.noaa.gov">www.class.noaa.gov</a>
tle	Two Line Element (TLE) ancillary file	DRL ftp site for TLEs: <a href="ftp://is.sci.gsfc.nasa.gov/ancillary/ephemeris/tle/drl.tle.yyyymmddhh">ftp://is.sci.gsfc.nasa.gov/ancillary/ephemeris/tle/drl.tle.yyyymmddhh</a> Archived TLEs: <a href="ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/ephemeris/tle/drl.tle.yyyymmddhh">ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/ephemeris/tle/drl.tle.yyyymmddhh</a> Where yyyy, mm, dd, hh represents the year, month, day, and hour for the tle ancillary file.
polar	Polar Wander ancillary file	DRL ftp site for Polar Wander files: <a href="ftp://is.sci.gsfc.nasa.gov/ancillary/temporal/off_USNO-PolarWander-UT1-ANC_Ser7_USNO_000f_yyyymmdd*.ascii">ftp://is.sci.gsfc.nasa.gov/ancillary/temporal/off_USNO-PolarWander-UT1-ANC_Ser7_USNO_000f_yyyymmdd*.ascii</a> Archived Polar Wander files: <a href="ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/temporal/off_USNO-PolarWander-UT1-ANC_Ser7_USNO_000f_yyyymmdd*.ascii">ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/temporal/off_USNO-PolarWander-UT1-ANC_Ser7_USNO_000f_yyyymmdd*.ascii</a> Where yyyy, mm, dd represents the year, month, and day for the polar wander ancillary file.

sdr.lut	Cris Look Up Tables (LUTs) compressed tar file (Optional)	DRL ftp site for Cris LUTs: <a href="ftp://is.sci.gsfc.nasa.gov/ancillary/LUTs/npp/cris/CRIS-SDR_BE_LUTs_yymmdd.tar.gz">ftp://is.sci.gsfc.nasa.gov/ancillary/LUTs/npp/cris/CRIS-SDR_BE_LUTs_yymmdd.tar.gz</a>  Archived Cris LUTs: <a href="ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/LUTs/npp/cris/CRIS-SDR_BE_LUTs_yymmdd.tar.gz">ftp://is.sci.gsfc.nasa.gov/ArchivedAncillary/LUTs/npp/cris/CRIS-SDR_BE_LUTs_yymmdd.tar.gz</a>  Where yy, mm, dd represents the year, month, and day for the LUT collection file.
leapsec	Leapsec ancillary file	DRL ftp site for leapsec files: <a href="ftp://is.sci.gsfc.nasa.gov/ancillary/temporal/leapsec.yyyymmddhh">ftp://is.sci.gsfc.nasa.gov/ancillary/temporal/leapsec.yyyymmddhh</a>  Where yyyy, mm, dd, hh represents the year, month, day, and hour for the leapsec ancillary file.
Output File Labels	Description	Destination (when SPA is installed into IPOPP)
cris.scris	Cris SDR output HDF file path	/raid/pub/gsfcdata/npp/cris/level1/SCRIS_npp_dyyyymmdd_thhmmssS_ehhmmssS*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath.
cris.gcrso	Cris Geolocation output HDF file path	/raid/pub/gsfcdata/npp/cris/level1/GCRSO_npp_dyyyymmdd_thhmmssS_ehhmmssS*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath.
cris.rgcrs	Cris Geolocation (radians version) output HDF file path	/raid/pub/gsfcdata/npp/cris/level1/RGCRS_npp_dyyyymmdd_thhmmssS_ehhmmssS*.h5  Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath.

cris.rgtrs	Cris Geolocation (radians and terrain corrected version) output HDF file path	/raid/pub/gsfcdata/npp/cris/level1/RGTRS_npp_dyymmdd_thhmmssS_ehhmmssS*.h5 Where yyyy, mm, dd represents the year, month, and day for the start of the swath; the first hh, mm, ss, S represents the hour, minutes, seconds, and 10 <sup>th</sup> of a second for the start of the swath and the second hh, mm, ss, S represents the end time of the swath.
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## NOTES:

1. The input ATMS RDR must have a minimum of 3 granules for successful ATMS SDR generation.
2. The input Cris RDR must have a minimum of 9 granules for successful Cris SDR generation.
3. The TLE file must be within 14 days of the input RDR file. Use the TLE closest to, but prior, to the date of the input RDR file. The TLE files provided by the DRL are time-stamped as follows: drl.tle.yyyymmddhh.
4. The Polar Wander file must be within 30 days of the input RDR file. Use the Polar Wander file closest to, but prior, to the date of the input RDR file. The Polar Wander files provided by the DRL are time-stamped as follows: off\_USNO-PolarWander-IT1-ANC\_Ser7\_USNO\_000f\_yyyymmdd\*
5. If the Big-Endian (BE) LUT collection set tar file is not provided in the command line, the SPA uses the default SDR BE LUT collection set included with this release. Use the SDR BE LUT collection set that is closest to, but prior, to the date of the input RDR file. The LUT collection sets are time-stamped as follows: {Sensor}-SDR\_BE\_LUTs\_yyyymmdd.tar.gz, where {Sensor} is 'VIIRS', 'CRIS', or 'ATMS'.
6. Leapsec ancillary files are cumulative. Use the latest leapsec file available regardless of the RDR date. The leapsec files provided by the DRL are time-stamped as follows: leapsec.yyyymmddhh.

**Execute the 'run':** The following is an example of a command line to run the VIIRS SDR algorithm from the testscripts directory:

```
$ ./wrapper/VIIRS_C-SDR/run \
viirs.rdr \
./testdata/input/RNSCA-RVIIRS_npp_d20140601_t1805402_e1807056_b13441_c20140624172356247223_noaa_ops.h5 \
viirs.gdnbo ./testdata/output/GDNBO.h5 \
viirs.gimgo ./testdata/output/GIMGO.h5 \
viirs.gitco ./testdata/output/GITCO.h5 \
viirs.gmodo ./testdata/output/GMODO.h5 \
viirs.gmtco ./testdata/output/GMTCO.h5 \
```

```

viirs.icdbg ..testdata/output/ICDBG.h5 \
viirs.ivcdb ..testdata/output/IVCDB.h5 \
viirs.ivobc ..testdata/output/IVOBC.h5 \
viirs.svndb ..testdata/output/SVDNB.h5 \
viirs.svi01 ..testdata/output/SVI01.h5 \
viirs.svi02 ..testdata/output/SVI02.h5 \
viirs.svi03 ..testdata/output/SVI03.h5 \
viirs.svi04 ..testdata/output/SVI04.h5 \
viirs.svi05 ..testdata/output/SVI05.h5 \
viirs.svm01 ..testdata/output/SVM01.h5 \
viirs.svm02 ..testdata/output/SVM02.h5 \
viirs.svm03 ..testdata/output/SVM03.h5 \
viirs.svm04 ..testdata/output/SVM04.h5 \
viirs.svm05 ..testdata/output/SVM05.h5 \
viirs.svm06 ..testdata/output/SVM06.h5 \
viirs.svm07 ..testdata/output/SVM07.h5 \
viirs.svm08 ..testdata/output/SVM08.h5 \
viirs.svm09 ..testdata/output/SVM09.h5 \
viirs.svm10 ..testdata/output/SVM10.h5 \
viirs.svm11 ..testdata/output/SVM11.h5 \
viirs.svm12 ..testdata/output/SVM12.h5 \
viirs.svm13 ..testdata/output/SVM13.h5 \
viirs.svm14 ..testdata/output/SVM14.h5 \
viirs.svm15 ..testdata/output/SVM15.h5 \
viirs.svm16 ..testdata/output/SVM16.h5 \
sdr.lut ..testdata/input/VIIRS-SDR_BE_LUTs_140620.tar.gz \
tle ..testdata/input/drl.tle.2014060113 \
polar ..testdata/input/off_USNO-PolarWander-UT1-ANC_Ser7_USNO_000f_20140530_201405300000Z_20140530000004Z_ee20140606120000Z_np.ascii \
leapsec..testdata/input/leapsec.2014062301.dat

```

The following is an example of a command line to run the ATMS SDR algorithm from the testscripts directory:

```

$ ../wrapper/ATMS_C-SDR/run \
atms.rdr \
../testdata/input/RATMS-RNSCA_npp_d20140601_t1801289_e1809289_b13441_c20140602000941656825_noaa_ops.h5 \
atms.fatms ..testdata/output/FATMS.h5 \
atms.gatmo ..testdata/output/GATMO.h5 \
atms.satms ..testdata/output/SATMS.h5 \
atms.tatms ..testdata/output/TATMS.h5 \
sdr.lut ..testdata/input/ATMS-SDR_BE_LUTs_131120.tar.gz \
tle ..testdata/input/drl.tle.2014060113 \
polar ..testdata/input/off_USNO-PolarWander-UT1-ANC_Ser7_USNO_000f_20140530_201405300000Z_20140530000004Z_ee20140606120000Z_np.ascii \
leapsec..testdata/input/leapsec.2014062301.dat

```

The following is an example of a command line to run the CrIS SDR algorithm from the testscripts directory:

```

$ ../wrapper/CRIS_C-SDR/run \
cris.rdr..testdata/input/RCRIS-RNSCA_npp_d20140601_t1801289_e1809289_b13441_c20140602000944767244_noaa_ops.h5 \
cris.gcrso ..testdata/output/GCRSO.h5 \
cris.rgcrs ..testdata/output/RGCRS.h5 \
cris.rgtrs ..testdata/output/RGTRS.h5 \

```

```
cris.scris ../testdata/output/SCRIS.h5 \
sdr.lut ../testdata/input/CRIS-SDR_BE_LUTs_120501.tar.gz \
tle ../testdata/input/drl.tle.2014060113 \
polar ../testdata/input/off_USNO-PolarWander-UT1-ANC_Ser7_USNO_000f_20140530_201405300000Z_20140530000004Z_ee20140606120000Z_np.ascii \
\ leapsec../testdata/input/leapsec.2014062301.dat
```

A successful execution usually requires between a few minutes to an hour depending on which SDR algorithm is executed, the speed of your computer, and the number of granules in the RDR input. If execution fails, you will see an error message indicating the cause of failure (e.g., a file cannot be found, or a label cannot be recognized). Correct it and run again. If the problem has some other cause, it can be identified using the log files. Log files are automatically generated within the directory used for execution. They start with stdfile\* and errfile\* and can be deleted after execution. Other log and intermediate files may be generated automatically within the directory used for execution. They are useful for traceability and debugging purposes. However it is strongly recommended that users clean up log files and intermediate files left behind in the run directory before initiating a fresh execution of the SPA. Intermediate files from a previous run may affect a successive run and produce ambiguous results. The 'run' can be executed from any directory the user chooses. This can be done by prefixing it with the file path for the 'run' script.

### To Use the Scripts in the testscripts Directory

One simple way to run the algorithms from the directory of your choice using your own data is to copy the run-\* .sh script from the testscripts directory to the selected directory. Change the values of the variables like WRAPPERHOME, INPUTHOME and OUTPUTHOME to reflect the file paths of the wrapper directories and the input/output file paths. Then modify the input/output file name variables. Run the script to process your data.

## Appendix A

### SPA Stations

Installation of this SPA in IPOPP mode will make the SPA stations listed in Table A-1 available to IPOPP. These stations along with any other pre-requisite stations (listed in Table A-2) will need to be enabled to allow IPOPP to automate production of the C-SDR data products. Further, users who wish to generate image products from the data products generated by this SPA will need to enable the image-generating stations listed in Table A-3. The SPAs containing the pre-requisite and the image-generating stations listed in Tables A-2 and A-3 can be downloaded from the DRL Web Portal, in case they are not already available in your IPOPP installation. Details about these other SPAs are available in the respective SPA User's Guide. Please refer to the IPOPP User's Guide for instructions on how to install an SPA in IPOPP and enable the corresponding stations.

**Table A-1. SPA Stations**

<b>SPA stations for this SPA</b>	<b>Data Products produced</b>
VIIRS_C-SDR	GDNBO_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 GIMGO_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 GITCO_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 GMODO_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 GMTCO_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 ICDBG_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 IVCDB_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 IVOBC_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVDBN_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVI01_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVI02_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVI03_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVI04_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVI05_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVM01_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVM02_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVM03_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVM04_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVM05_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVM06_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVM07_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVM08_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVM09_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVM10_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVM11_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVM12_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVM13_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVM14_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5 SVM15_npp_dyyyymmdd_thhmmsssS_ehhmmssS*.h5

	SVM16_npp_dyyyymmdd_thhhmmsssS_ehhmmssS*.h5
CRIS_C-SDR	GCRSO_npp_dyyyymmdd_thhhmmsssS_ehhmmssS*.h5 RGCRS_npp_dyyyymmdd_thhhmmsssS_ehhmmssS*.h5 RGTRS_npp_dyyyymmdd_thhhmmsssS_ehhmmssS*.h5 SCRIS_npp_dyyyymmdd_thhhmmsssS_ehhmmssS*.h5
ATMS_C-SDR	FATMS_npp_dyyyymmdd_thhhmmsssS_ehhmmssS*.h5 GATMO_npp_dyyyymmdd_thhhmmsssS_ehhmmssS*.h5 SATMS_npp_dyyyymmdd_thhhmmsssS_ehhmmssS*.h5 TATMS_npp_dyyyymmdd_thhhmmsssS_ehhmmssS*.h5

**Table A-2. Prerequisite Stations**

Pre-requisite SPA stations	SPA in which they are available
None	None

**WARNING:** The stations VIIRS-SDR and VIIRS\_C-SDR must never be run simultaneously.

**Table A-3. Image-generating Stations**

Image-generating stations	SPA in which they are available
vtoatcolor-geotiff	H2G
vdnbday-geotiff	H2G
vdnbnight-geotiff	H2G
vm12h5-geotiff	H2G